INTRODUCTION | GRADE 6

Science Literacy for All Students

Science is a way of knowing, a process for gaining knowledge and understanding of the natural world. Engineering combines the fields of science, technology, and mathematics to provide solutions to real-world problems. The nature and process of developing scientific knowledge and understanding includes constant questioning, testing, and refinement, which must be supported by evidence and has little to do with popular consensus. Since progress in the modern world is tied so closely to this way of knowing, scientific literacy is essential for a society to be competitively engaged in a global economy. Students should be active learners who demonstrate their scientific understanding by using it. It is not enough for students to read about science; they must participate in the three dimensions of science. They should observe, inquire, question, formulate and test hypotheses, analyze data, report, and evaluate findings. The students, as scientists, should have hands-on, active experiences throughout the instruction of the science curriculum. These standards help students find value in developing novel solutions as they engage with complex problems.

Three Dimensions of Science[1]

Science education includes three dimensions of science understanding: science and engineering practices, crosscutting concepts, and disciplinary core ideas. Every standard includes each of the three dimensions; **Science and Engineering Practices are bolded**, Crosscutting Concepts are underlined, and Disciplinary Core Ideas are in normal font. Standards with *specific engineering expectations are italicized.*

Scientific and Engineering Practices	Crosscutting Concepts	Disciplinary Core Ideas
▸ Asking questions or defining problems ▸ Developing and using models ▸ Planning and carrying out investigations ▸ Analyzing and interpreting data ▸ Using mathematics and computational thinking ▸ Constructing explanations and designing solutions ▸ Engaging in argument from evidence ▸ Obtaining, evaluating, and communicating information	▸ Patterns ▸ Cause and effect: mechanism and explanation ▸ Scale, proportion, and quantity ▸ Systems and system models ▸ Energy and matter: flows, cycles, and conservation ▸ Structure and function ▸ Stability and change	▸ Earth and Space Science ▸ Life Science ▸ Physical Science ▸ Engineering

[1] NRC Framework K–12 Science Education: http://www.nap.edu/catalog.php?record_id=13165

Strand 6.3: EARTH'S WEATHER PATTERNS AND CLIMATE

All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. Heat energy from the Sun, transmitted by radiation, is the primary source of energy that affects Earth's weather and drives the water cycle. Uneven heating across Earth's surface causes changes in density, which result in convection currents in water and air, creating patterns of atmospheric and oceanic circulation that determine regional and global climates.

- **Standard 6.3.1** **Develop a model** to describe how the cycling of water through Earth's systems is driven by energy from the Sun, gravitational forces, and density.
- **Standard 6.3.2** **Investigate** the interactions between air masses that cause changes in weather conditions. Collect and analyze weather data to provide evidence for how air masses flow from regions of high pressure to low pressure causing a change in weather. Examples of data collection could include field observations, laboratory experiments, weather maps, or diagrams.
- **Standard 6.3.3** **Develop and use a model** to show how unequal heating of the Earth's systems causes patterns of atmospheric and oceanic circulation that determine regional climates. Emphasize how warm water and air move from the equator toward the poles. Examples of models could include Utah regional weather patterns such as lake-effect snow and wintertime temperature inversions.
- **Standard 6.3.4** **Construct an explanation supported by evidence** for the role of the natural greenhouse effect in Earth's energy balance, and how it enables life to exist on Earth. Examples could include comparisons between Earth and other planets such as Venus and Mars.